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COMPLETE SPECIFICATION

Improvements in Hydraulic Couplings

We, J. M. VOITH G.m.b.H., of Heidenheim (Brenz), Germany, a Company organised and existing under the Laws of the Federal Republic of Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a hydraulic coupling of the type the degree of filling of which can be varied by means of an adjustable scoop tube, which is arranged in a chamber disposed adjacent the working chamber of the coupling and forms with the working chamber a communicating container; the scoop tube chamber and the working space of the coupling are for this purpose connected to one another by large unthrottled openings or pipes.

In such hydraulic couplings the balanced oil circulation necessary for cooling is also effected by the scoop tube. In many applications it is, however, possible to operate without such additional oil circulation. For example in the driving of the air blower of large diesel engines a coupling of relatively large diameter can result from the given characteristics of the blower, the normal surface of the coupling affording during operation sufficient cooling, particularly if the rotating coupling housing serves directly as the hub, over which the air flows, of the blower rotor.

For such applications of a controllable coupling of the above-mentioned type the invention provides a particularly suitable construction. The invention consists in the proposal to employ the scoop tube both for emptying and for filling the coupling and for this purpose to connect it to a source of pressure liquid of small and preferably constant pressure. In this way it is possible for the scoop tube, upon emptying of the coupling, i.e. upon outward movement of the scoop tube, to supply liquid against the pressure of the said pressure source, but on the other hand for the purpose of filling the coupling permits liquid to flow from this pressure source into the coupling. As the pressure liquid source there may for example serve a gravity tank which is so arranged that the scoop tube upon being displaced outwardly for emptying the coupling is capable of scooping the filling out of the coupling against the static pressure in the tank and in the connecting pipe between itself and the tank, and to feed the filling into the tank, whilst on the other hand upon withdrawal of the scoop tube for the purpose of filling the coupling the liquid flows out of the tank through the scoop tube into the scoop tube chamber and thus flows into the working space of the coupling.

Instead of a gravity tank there may also be used any other suitable source of pressure liquid, for example, a liquid reservoir in which the surface of the liquid is subject to air under pressure. The scoop tube may however also be connected to the pressure pipe of another liquid circuit, so long as this liquid is suitable for the coupling, for example, to the pressure pipe of a pump provided for another purpose, said pump for example withdrawing liquid from a sump and being provided with an additional outlet.

In the construction according to the invention there is the advantage that any desired expansion of the oil when heated is permitted. Further, the liquid content in the coupling itself can be continuously restored automatically to replace leakage losses from the entire liquid reserve of the system. The coupling may therefore be sealed at all parts without the packing being overstressed by internal excess pressure. A further advantage is that the energy losses occurring in all previously known constructions in the equilibrium condition due to the scooping of liquid charged with energy, are reduced. The circulating liquid is in fact in those cases brought by the impeller to a high peripheral velocity and thus given energy of which

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only a very small part is necessary for overcoming the flow resistance, whilst the remaining part is lost. The scoop tube losses are accordingly reduced to a minimum in the construction according to the invention.

The admission to and removal of air from the coupling, necessary with alterations in the filling, may be effected by a centrifugally controlled valve which is closed at zero speed. Another possibility consists in the provision of a ventilating pipe which is closed against oil leakage.

The invention is illustrated by way of example in the accompanying drawing, which shows a hydraulic coupling according to the invention for the controlled drive of a cooling blower for the cooler of an internal combustion engine.

To the cylinder block 1 is secured an arm 2 which carries a pivot 3 formed by a tube. On this pivot is mounted a shaft 4 which at one end carries a driving pulley 5 and at its other end carries the impeller 6. The runner 7 is connected with the hub 8 which is journalled at one side on the impeller shaft 4 and at the other side on the pivot 3. The hub carries the blower blades 9.

On the end lying within the hub the pivot 3 has an arm 10 in which the scoop tube 11 is journalled by means of a hollow pivot 12 parallel to the axis. To the scoop tube pivot is secured an annulus gear or toothed segment 13 which engages in a toothed segment 16 rotatably mounted on the pivot 3 and coupled for rotation with a central adjusting shaft 14 by means of a connecting arm 15. The adjusting shaft 14 is mounted in the hollow pivot 3 by means of two annular discs 17 and 18 which at the same time serve for closing the space enclosed by the tubular pivot 3.

Through a lateral opening, the scoop tube pivot 12 is connected with a pipe 19 in the arm 10, pipe 19 leading into the tubular pivot 3 which likewise serves as an oil pipe. This is connected by a pipe 20 to the gravity tank 21. A second pipe 22 of smaller diameter connects the tank above its oil level to the centre of the coupling and serves as an air inlet and outlet pipe when the degree of filling of the coupling is altered. It is connected to the outer end of the central tubular adjusting shaft 14 which at its right-hand end is open and is connected with the coupling chamber.

On the outer end of the adjusting shaft 14 is a lever 23 which is actuated by the piston 24 of a thermostat the heat responsive member 25 of which is arranged in the cooler 26 and is connected with the piston 24 via connecting pipe 27. A spring 28 between the pivot 3 and the adjusting shaft 14 provides the desired bias between the thermostat and the adjusting lever 23.

The pipe 20 is under a practically constant pressure. The scoop tube always dips, in the stationary condition, only so far into the liquid ring 29 as to maintain the balance between the force arising from the energy of the liquid at the mouth of the scoop tube and the force corresponding to the supply pressure in the pipe 20.

Any deflection of the scoop tube from this position will then effect an additional filling or emptying of the coupling according to the direction of deflection, until the original balance is again adjusted in which condition there is no oil circulation or oil circulation between the tank and the coupling.

For the coupling oil there may be employed in this constructional form a special thin oil so as to avoid the soiling which can take place when thick engine oils are used.

Instead of a gravity tank there can be used as abovementioned another source of pressure. Thus it is possible to connect the coupling by means of a pressure pipe to an additional outlet of the main oil circuit of an internal-combustion engine.

What we claim is:—

1. A controllable hydraulic coupling provided with an adjustable scoop tube which is arranged in a chamber adjacent the working chamber of the coupling and forming therewith a communicating vessel, wherein the scoop tube serves for both filling and emptying of the coupling and for this purpose is connected to a source of pressure liquid at a small, substantially constant pressure.

2. A controllable hydraulic coupling according to claim 1, wherein the pressure source is a liquid reservoir in which the liquid surface is subject to air under pressure.

3. A controllable hydraulic coupling according to claim 1, wherein the pressure source is an external liquid circuit, for example an auxiliary outlet from a pressure pipe of a pump provided for another purpose.

4. A controllable hydraulic coupling according to claim 1, wherein a gravity tank is employed as the pressure source.

5. A controllable hydraulic coupling according to claim 4, comprising an air inlet and outlet pipe connected to the gravity tank above the liquid level therein and to an axially disposed entry in the coupling.

6. A controllable hydraulic coupling according to any of claims 1 to 4 provided with a ventilating valve which preferably operates automatically, for example by centrifugal force.

7. A controllable hydraulic coupling substantially as hereinbefore described with reference to the accompanying drawing.

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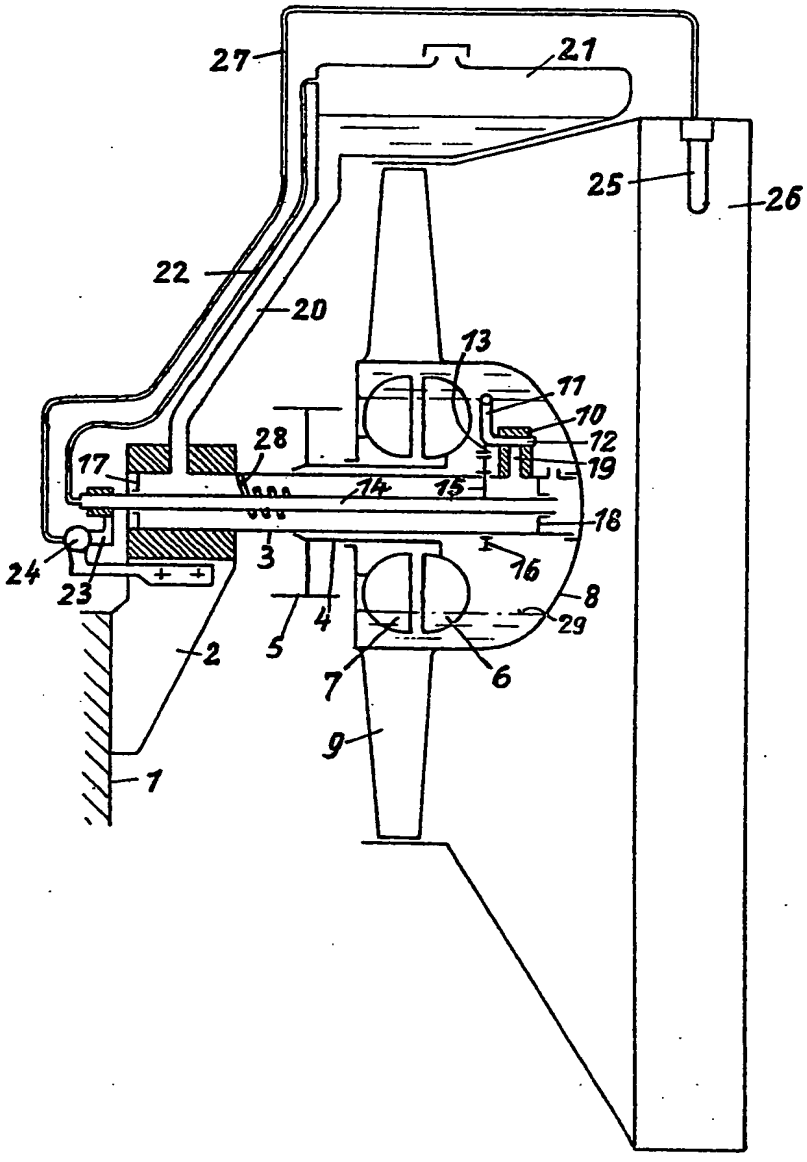
707,033 COMPLETE SPECIFICATION

1 SHEET

This drawing is a reproduction of the Original on a reduced scale.



PN	-GB707033 A 19540407
TI	-Improvements in hydraulic couplings
AB	-707,033. Cooling systems for engines. VOITH, GES., J. M. April 21, 1952 [April 23, 1951], No. 9989/52. Class 64(3) [Also in Group XXIX] A cooler 26 has a thermostat 25 control- ling the filling and emptying of a hydraulic coupling (see Group XXIX) the runner and casing of which forms the hub of a blower having blades 9.
EC	-F01P7/04B ; F16D33/14
PA	-VOITH GMBH J M
AP	-GB19520009989 19520421
PR	-DEX707033 19510423
DT	-O;TF